

Visualization of Multi-scale Formal Diagrams for Music Analysis

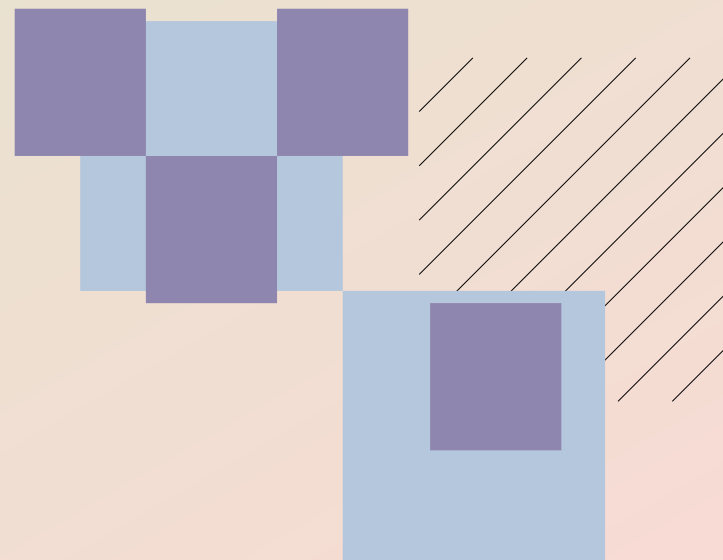
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³Université de Toulouse Jean-Jaurès

4th International Symposium on the Internet of Sounds
26-27 October 2023, Congress Center “Le benedettine”, Pisa, Italy



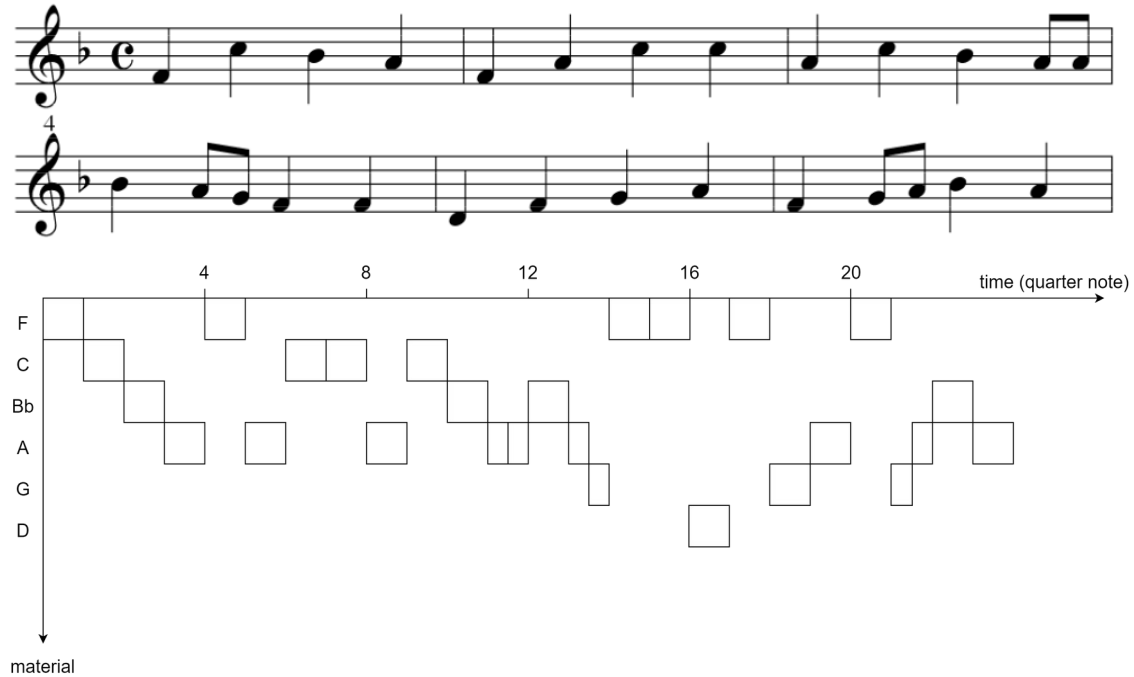
Formal Diagram

A Formal Diagram is the *representation* of a musical work's *materials* as a function of *time*.

Material: class of substitutable musical elements.

Object: occurrences of these materials in a given musical work.

Geisslerlied



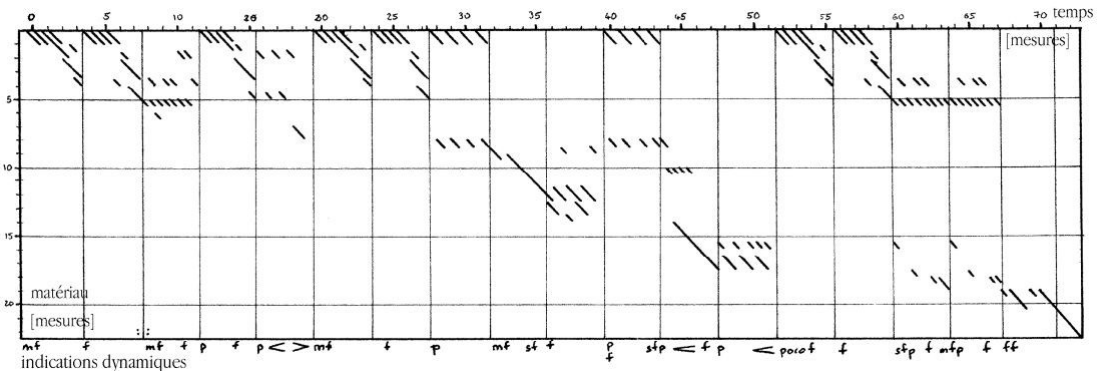
Mozart

5 (180) **RONDO.**
Allegretto.

W. A. M. 545.

5 first materials:

- three dotted eighth notes and a eighth note rest
- three ascending sixteenth notes and one descending sixteenth note
- four ascending sixteenth notes
- four descending sixteenth notes
- one dotted quarter note, followed by an eighth note and a eighth note rest

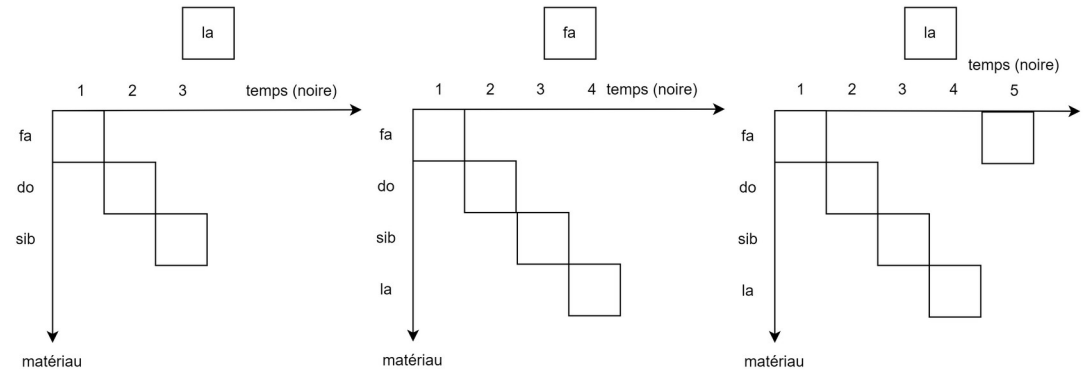
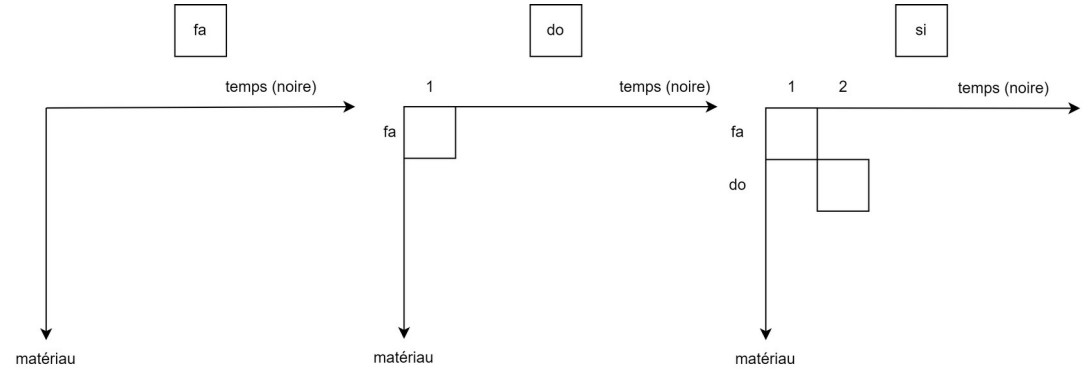
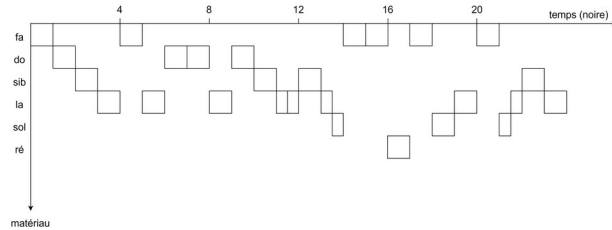


Chouvel, J.-M. *Analyse Musicale, sémiologie et cognition des formes temporelles*, L'Harmattan, Paris, 2006.

Cognitive Algorithm

Algorithm 1 Calculation of a formal diagram

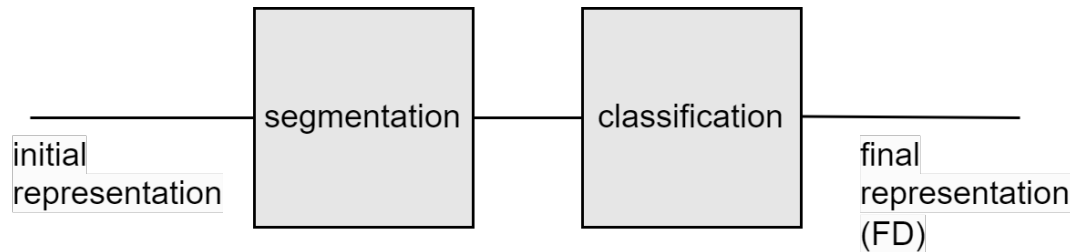
for each fragment heard:
 comparison with previous fragments;
 if different:
 inscription in material memory;
 in all cases: write in form memory;



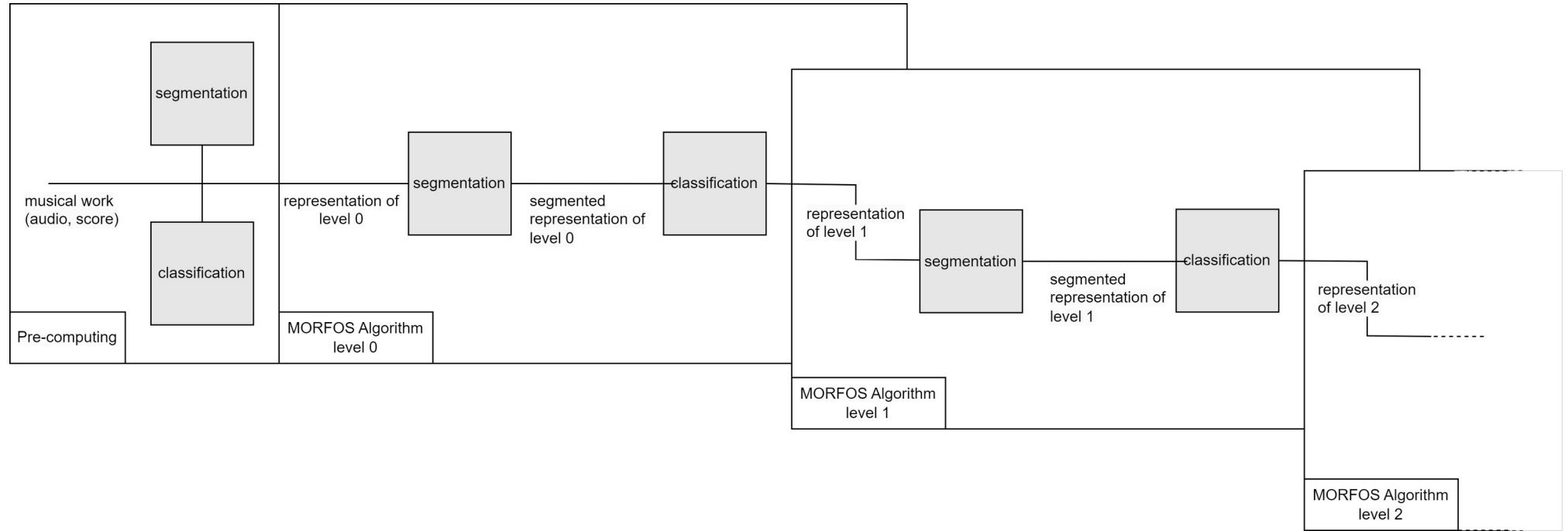
MORFOS

Description of the Cognitive Algorithm in 4 steps:

- Progressive acquisition of an initial representation
- Segmentation of this initial representation into fragments
- Classification of the fragment currently being listened to
- Progressive acquisition of the formal diagram



MORFOS : hierarchisation

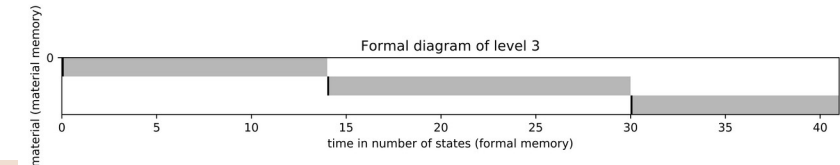
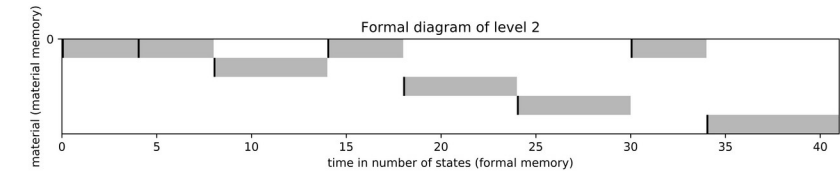
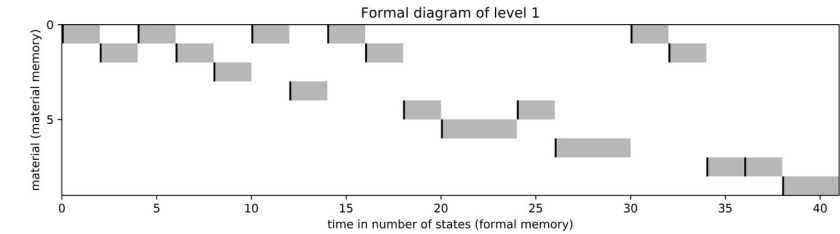
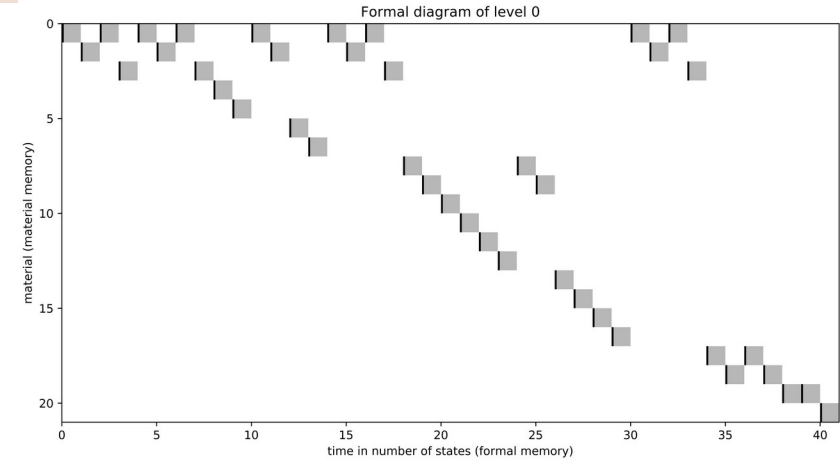


Hierarchisation - symbols

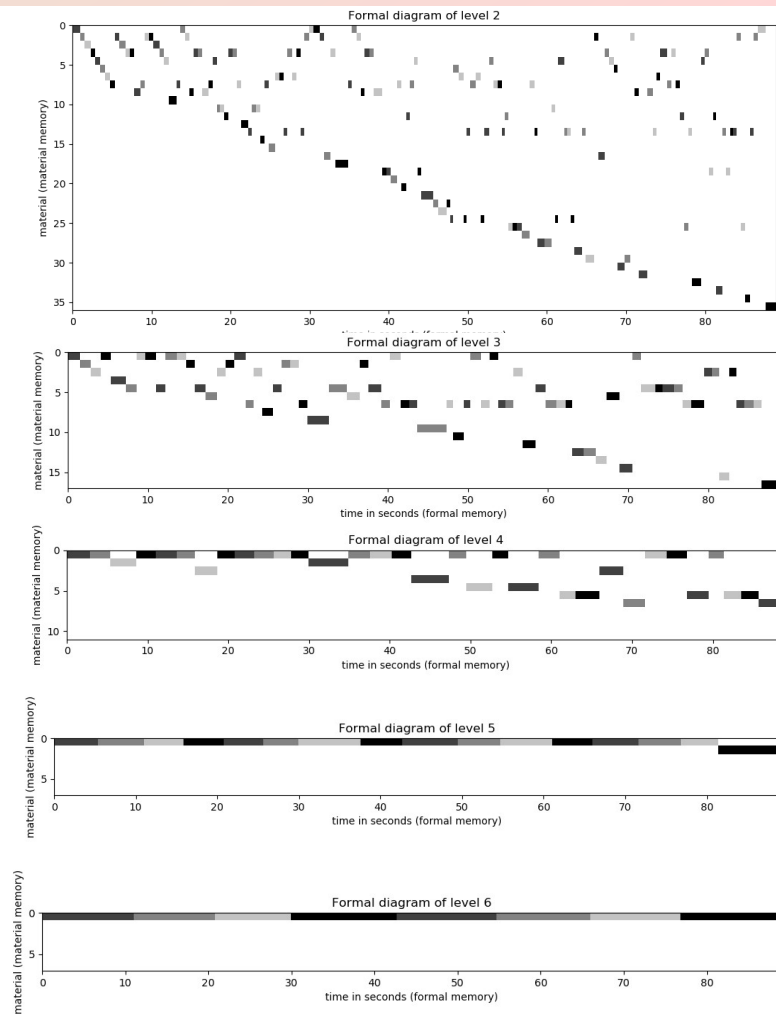
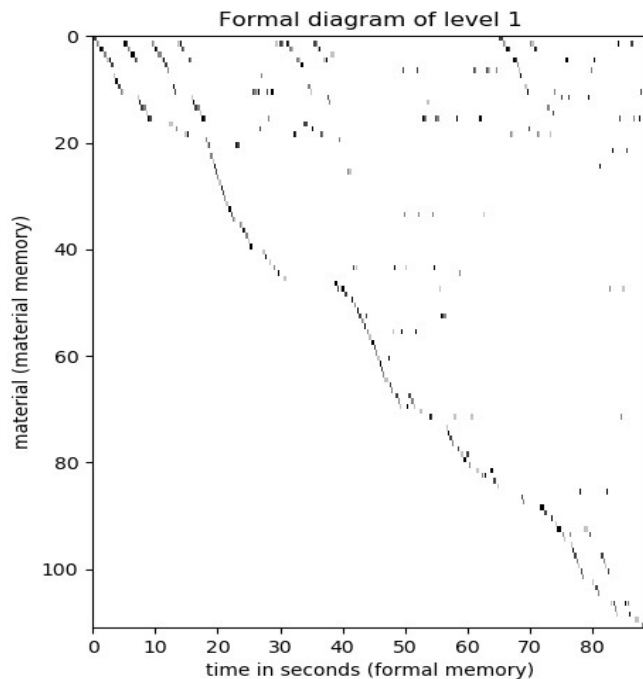
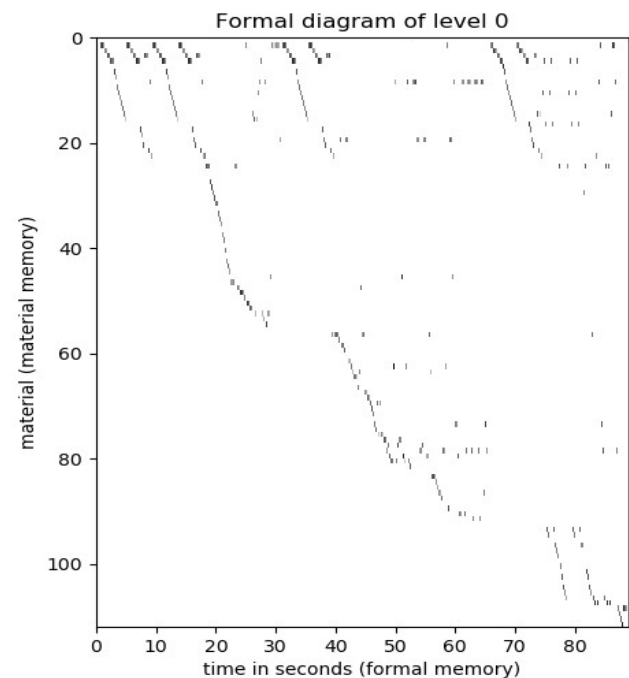
5 (180) **RONDO.**
Allegretto.

W. A. M. 515.

W. A. M. 545.

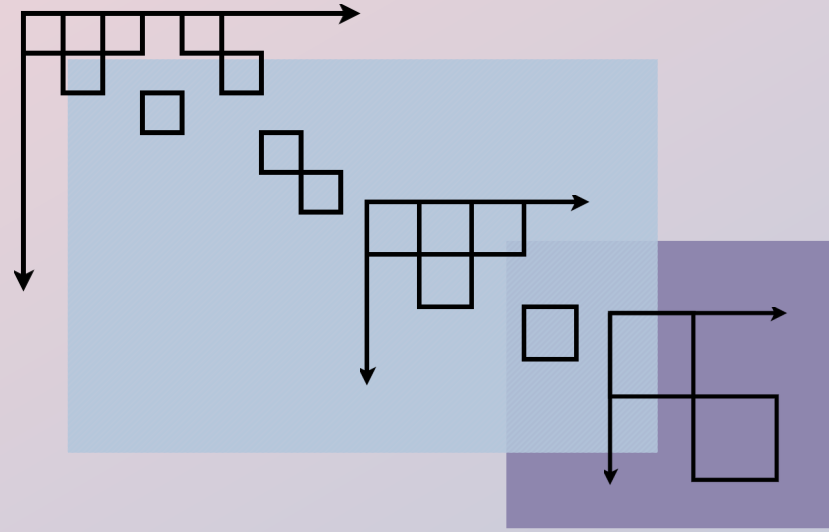


Hierarchisation - audio

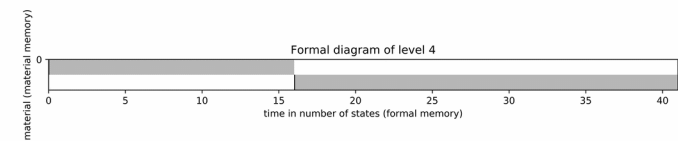
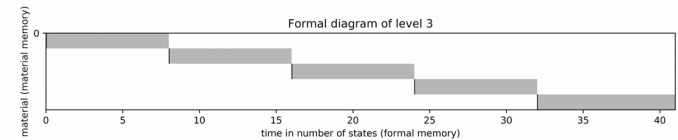
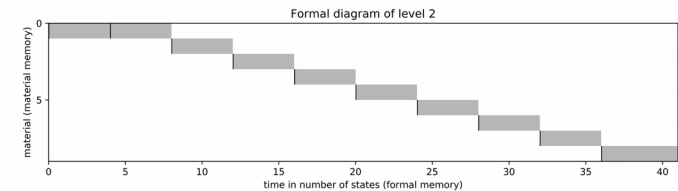
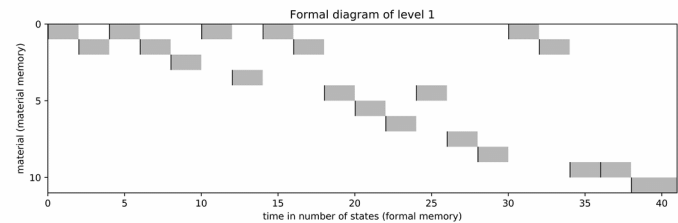
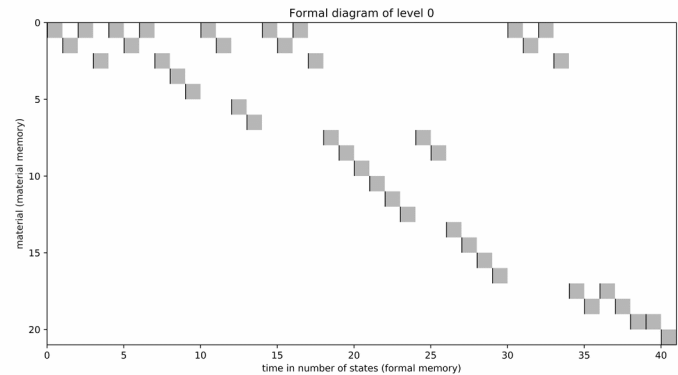
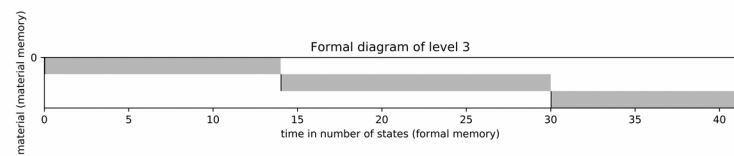
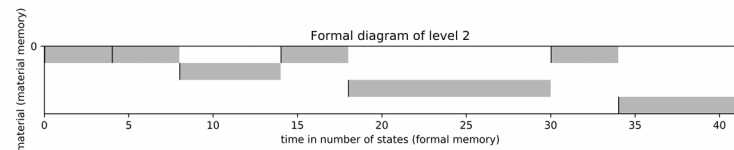
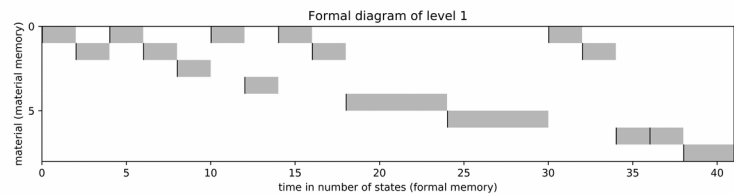
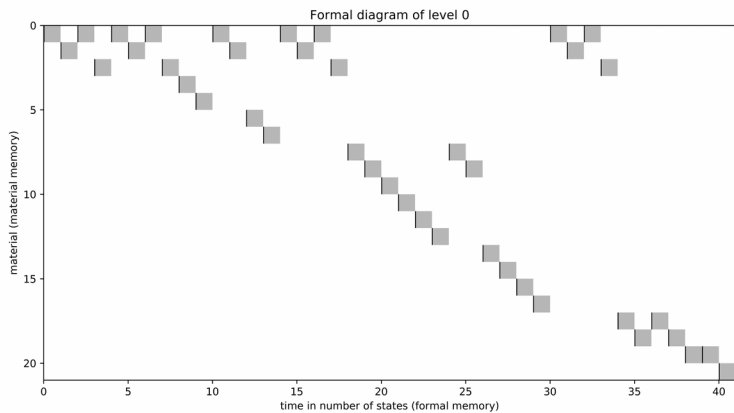


W.A. Mozart, Rondo K545, rules 1,2,3,4 and 5

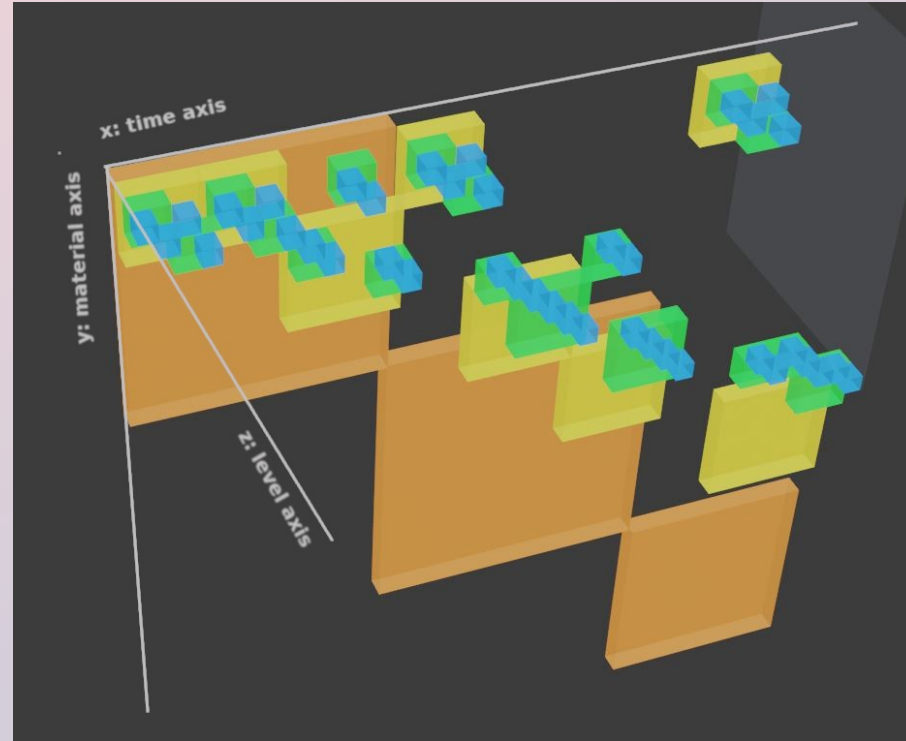
Which visualisations for the multi-scale formal diagram ?



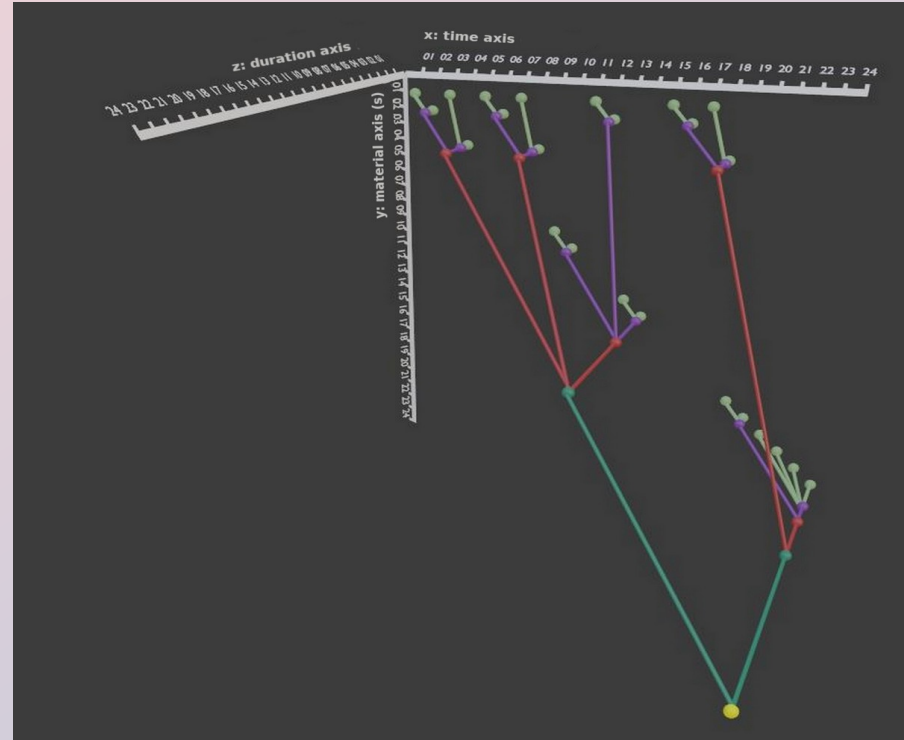
2D visualization



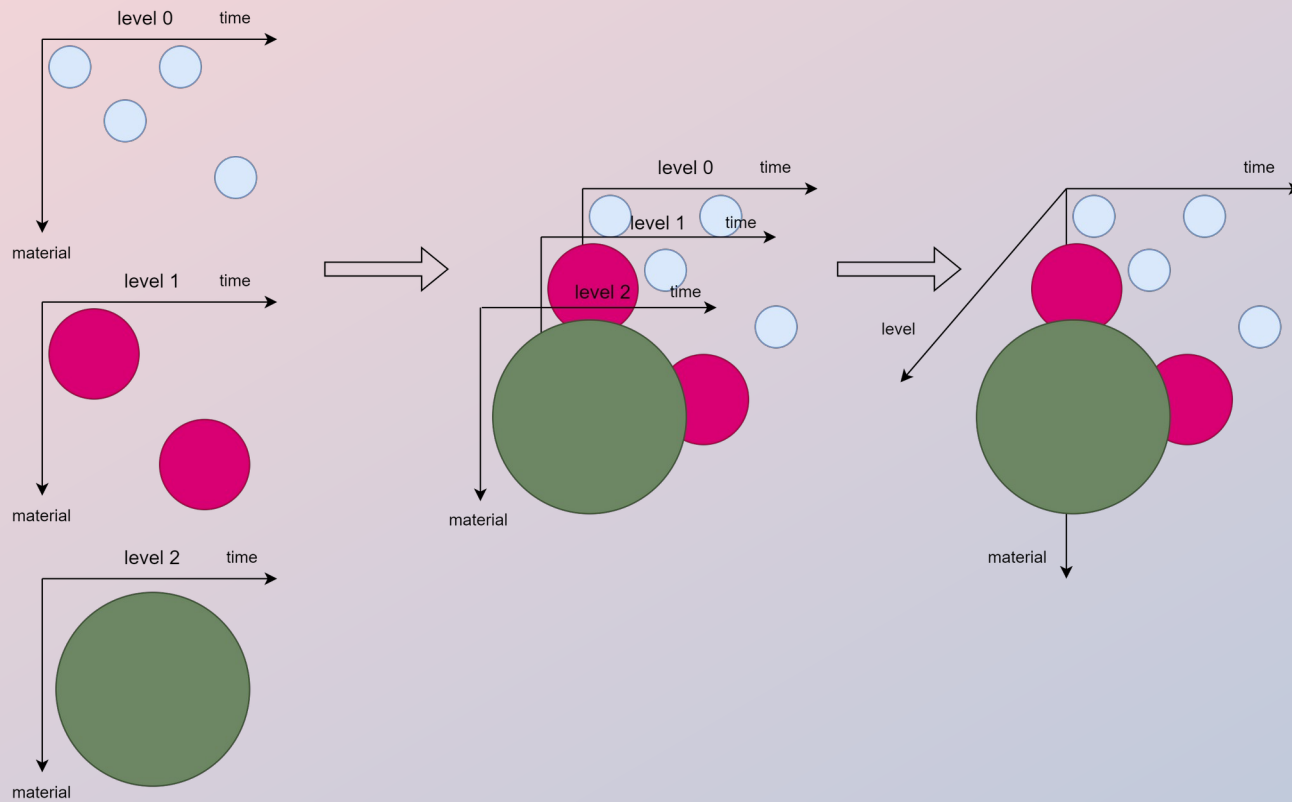
3D block-wise visualisation



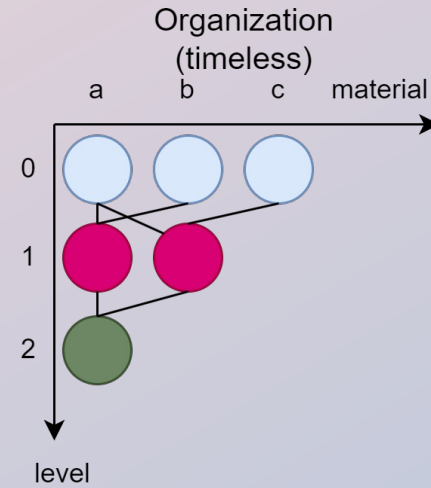
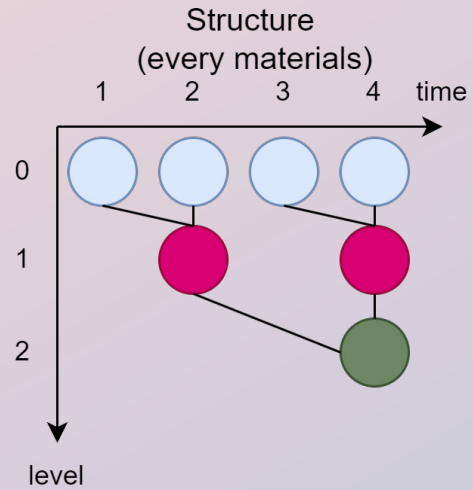
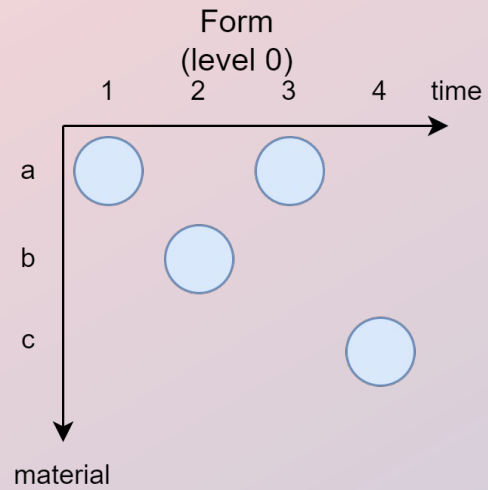
3D sphere-wise visualisation



3 planes

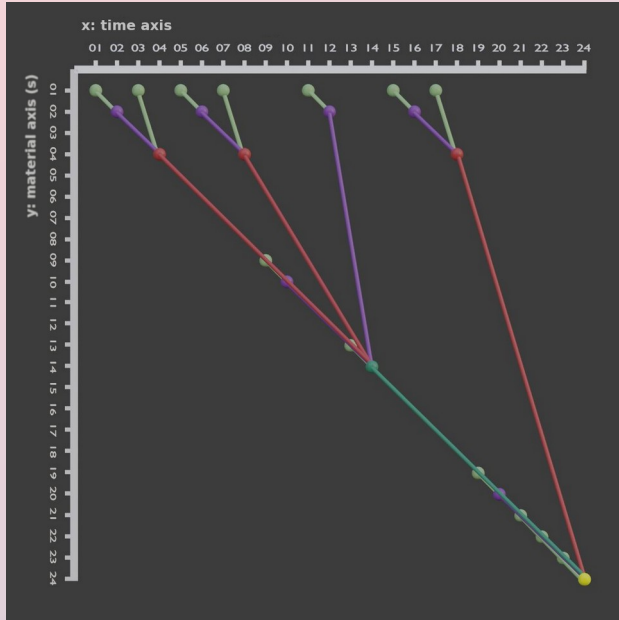


3 planes

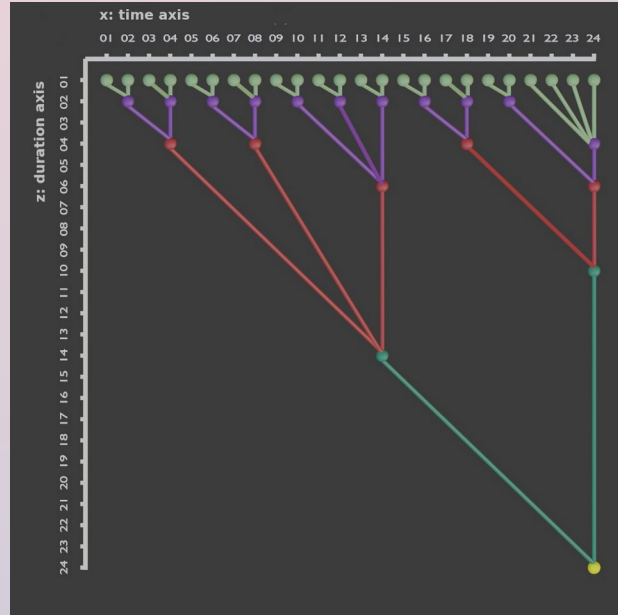


3 planes

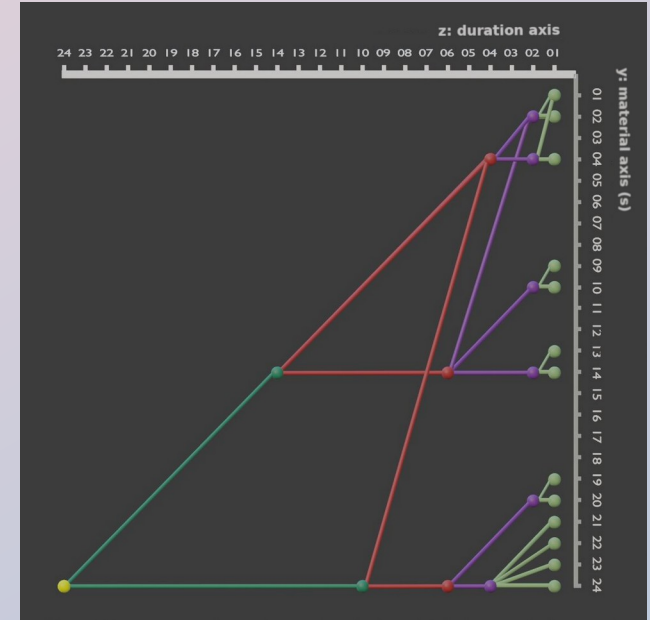
Form



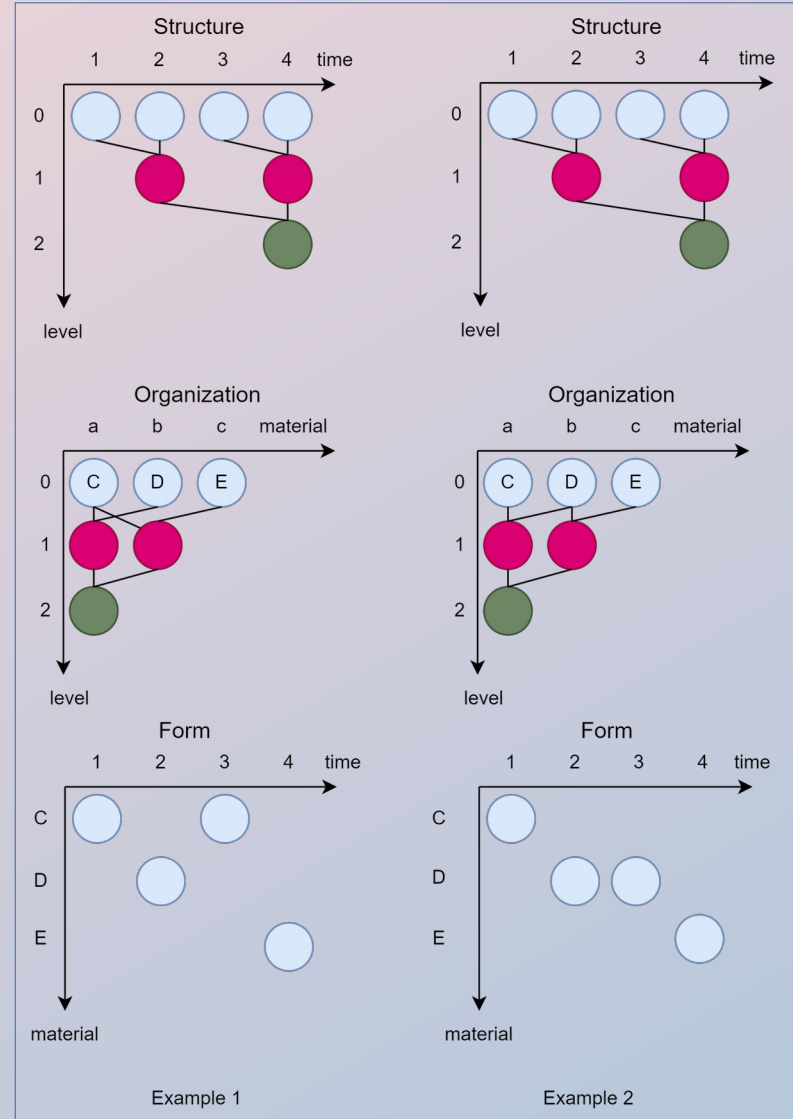
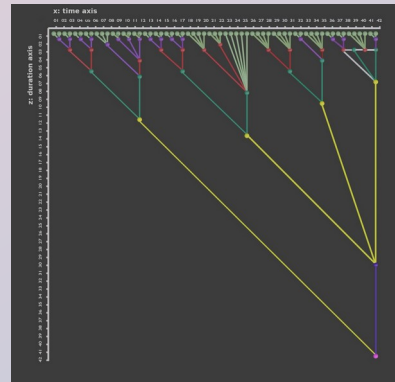
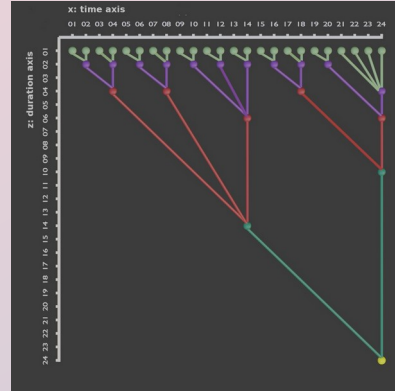
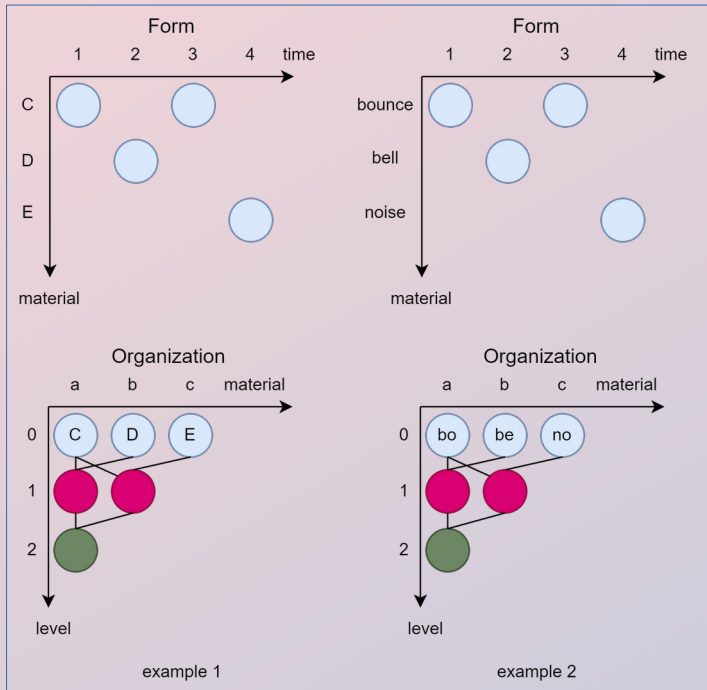
Structure



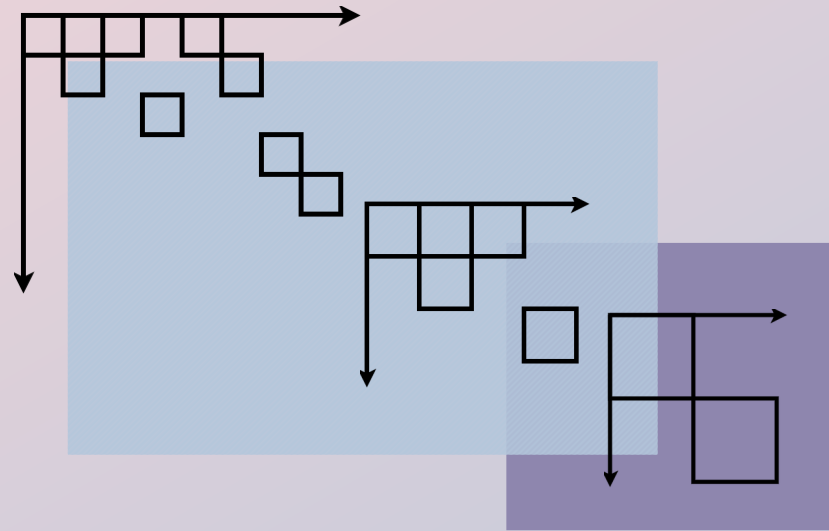
Organization



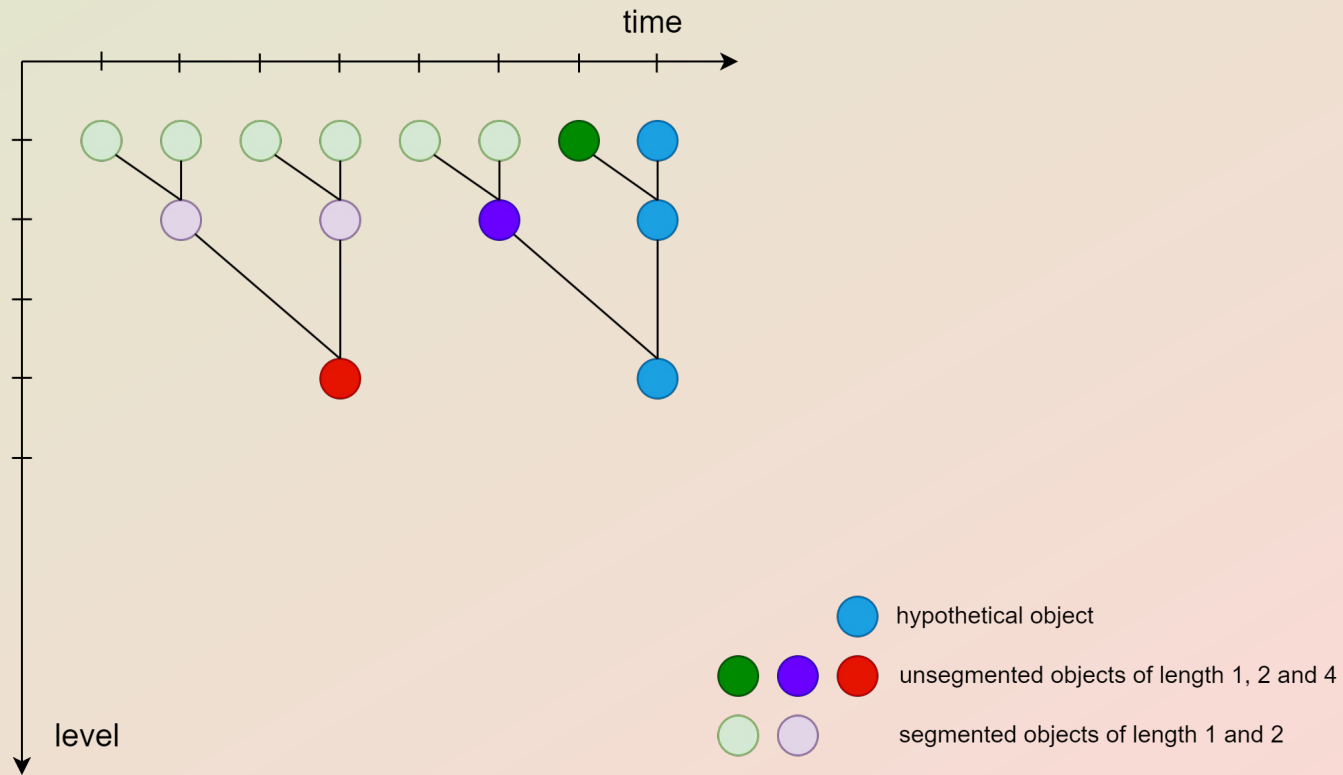
3 planes



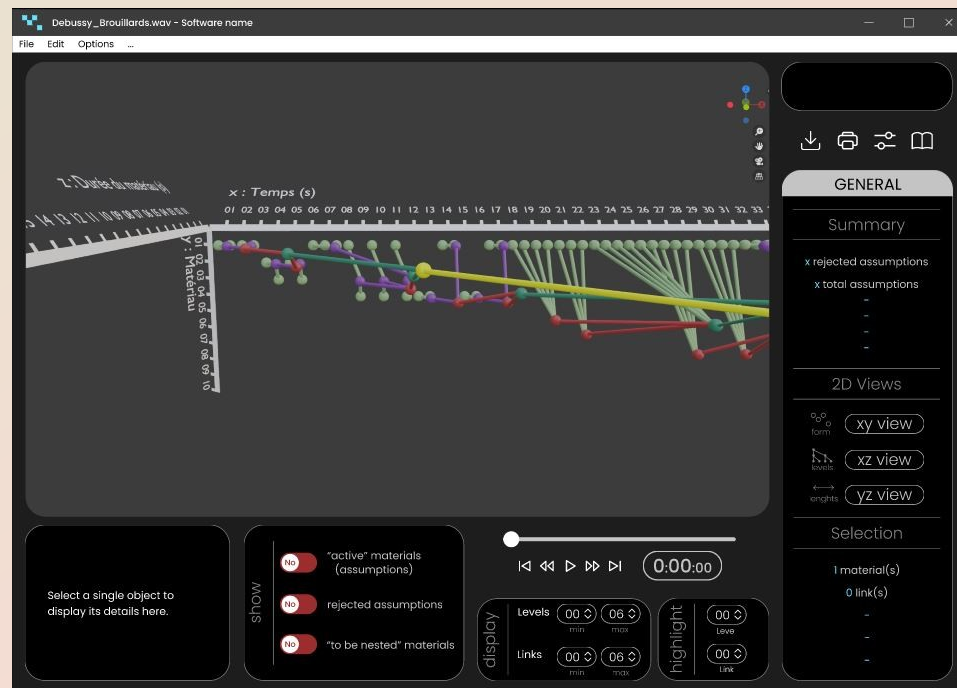
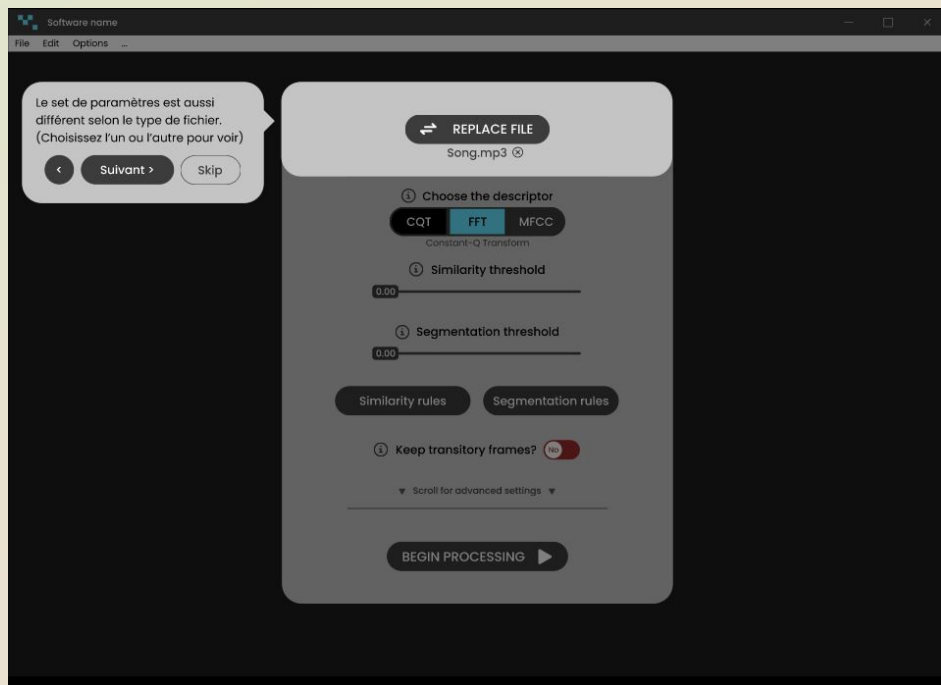
To go further...



Attention phenomena



Interface



Thank you !

